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IDEA-0272-67

Copy 5 of 5

17 April 67

MEMORANDUM FOR THE RECORD

SUBJECT : Pressure Suit Configuration for U-2R

REFERENCE: Letter from [] to John Parangosky,
dated 29 March 1967, Same Subject as above
(IDEA-0294-67)

The majority of suggestions and recommendations made in the referenced letter had previously been taken into consideration by the undersigned. The following comments apply to each paragraph of the referenced letter.

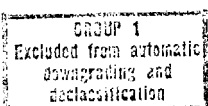
a. Helmet Weight and Comfort: In requesting a technical proposal for the modification of the S-901 J (SR-71 type) pressure suit from the David Clark Co., I directed that the major developmental efforts be aimed at reducing helmet weight and improving helmet comfort. The proposed S-1010 pilot's protective assembly for use in the U-2R will have a helmet which is wider and roomier but considerably lighter in weight. The neck ring is removed from the helmet and will ride more on the shoulder than being supported by the pilot's head. The breathing regulator will be attached to and oxygen routed through the neck ring, which will result in a major decrease in weight formerly supported by the head. There are no external connections to the helmet since the oxygen is routed through the neck ring and since the intercommunications and faceheat leads will also be routed internally. The visor will be thinner, the sunshade will be half as large, and lighter weight materials may be used for the helmet shell. The overall effects of these modifications should be a significant reduction in weight supported by the head, increased visual area, improved head mobility, reduced pilot fatigue and increased comfort.

b. Breathing Regulator: The faceplate/face barrier system is the only acceptable approach for the U-2R pressure suit. However, the necessity of providing dual delivery and sense lines is doubtful in my estimation. These are non-mechanical tubes which have no moving parts and in which flow is always away from the regulator.

USAF review(s)
completed.

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They will be constructed to preclude foreign objects from blocking them, but unless experience dictates otherwise, this tubing will not be made dual on the basis that the reliability gained is insignificant while the weight penalty, in a helmet we are making every effort to lighten, would be significant. As long as the sense line openings are constructed properly and mounted in a protected location, the actual diameter is immaterial since a pin-hole is sufficient for sensing pressure in a system of this nature. The advantages and disadvantages of dual exhalation valves will be given further consideration prior to making a final decision. However, the statement in the referenced letter that surface tension of moisture on an exhalation valve will stop breathing completely is misleading. This condition is frequently encountered with standard oxygen masks and is more of an annoyance than a dangerous situation. It will only occur with improperly maintained equipment and causes a momentary restriction to exhalation which is overcome by a short, forceful exhalation. The incident which gave rise to the statement in the referenced letter occurred with a helmet used for testing at LAC where neither adequate test and support equipment nor adequate life support technicians are available. It is significant that we have never had a single occurrence of a "sticking" exhalation valve in flight [REDACTED]

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c. Chest Strap Adjusting Buckle: This provision is under consideration, but will only be included if the chest strap can remain under the flotation garment. One of the major advantages of the SR-71 type pressure suit over the OXCART suit is that the flotation garment is over the parachute harness. This prevents incapacitation of the pilot if his flotation garment is inflated while the chest strap is tight. Elimination of this feature will not be considered. Also, loosening the chest strap during flight is a dangerous situation at best, and with the type of adjustment on this type of harness it is a difficult task for a man to perform himself. The more standard procedure is to have the harness adjusted to its optimum fit, as dictated by the pilot's experience, by the life support technician prior to flight. In a small program such as IDEALIST every technician knows every pilot's optimum personal equipment adjustment, fit, and desires and is extremely responsive to the pilot's complaints, likes and dislikes. It is unrealistic to compare this to a program such as that at Beale AFB where 50 or more technicians support a very large number of aircrews. In the small program the pilot takes off knowing his personal equipment is perfectly maintained and that his desires have been satisfied. In a larger program, such as the SR-71, minor ones like helmet tie down, are rarely, if ever, necessary.

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d. Outer Coverall: The U-2R outer cover will be an anti-snap layer of herringbone weave, dyed HT Nomex for flash fire protection. The color will be sage green or another suitable dark color for both glare reduction and camouflage value. Elimination of the aluminum coated coverall also reduces bulk and increases comfort and mobility.

e. Flotation and Water Survival: The flotation system to be used in the U-2R pressure suit will include all qualified improvements incorporated in OXCART to date. Limited information available to me on the parachute canopy deflation pockets indicates a more detailed investigation is required before such a modification could be considered for the U-2R parachute. The disadvantage of this modification is that parachute opening time is increased thus compromising minimum ejection altitude capability. The modification has only been tested on 28 ft. canopies to date, and the increase in opening time may be even greater with a 35 ft. canopy as used in the U-2R.

f. Suit Controller: This incident occurred at Beale in an RSO (back seat) flying in the SR-71. It is my understanding that Beale has been experiencing heat problems in their back seat RSO's that have caused the heat removal capacity of the pressure suit ventilation system to be exceeded. The heat problems are obviously not going to be encountered in the U-2R and, providing LAC will provision the U-2R with a reliable and adequate ventilation system, excessive sweat buildup at the controller should never occur.

g. Feeding and Relief: The U-2R pressure suit helmet will have an improved feeding port that will accommodate all foods and liquids presently used in IDEALIST. This requirement has been adequately considered by all involved. Relief provisions require some further attention and David Clark Co. is considering such provisions.

h. Glare/Reflections: I am sure this problem remains one of our largest hurdles to overcome. It was decided to produce the U-2R helmet with a standard gold-coated plastic visor for several reasons. Since the visor size (width) is increased in this helmet the PPG glass visors developed for OXCART cannot be fitted and new jigs, molds, etc. would have to be made. The delay involved would be considerable. The

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latest feeling of OXCART pilots regarding the PPG visor is that while it does reduce reflections significantly, the increased weight offsets the visual advantage and only one pilot is presently using this visor for evaluation. Because the U-2R visor is larger, the weight penalty of a glass visor will be even greater. Since helmet weight is being reduced in all ways we will have to see if the glare problem will be severe enough in the U-2R to warrant an increased weight penalty. One advantage of the U-2R is that no air refueling will be conducted and this is when most pilots feel that the glare problem is most critical. Also, the dark colored outercover of the U-2R pressure suit will reduce cockpit glare considerably.

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Capt USAF BSC
ASD/R&D/OSA

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ASD/OSA [redacted] pca (17 Apr 67)

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